Alaska SAR Facility Mapping Missions

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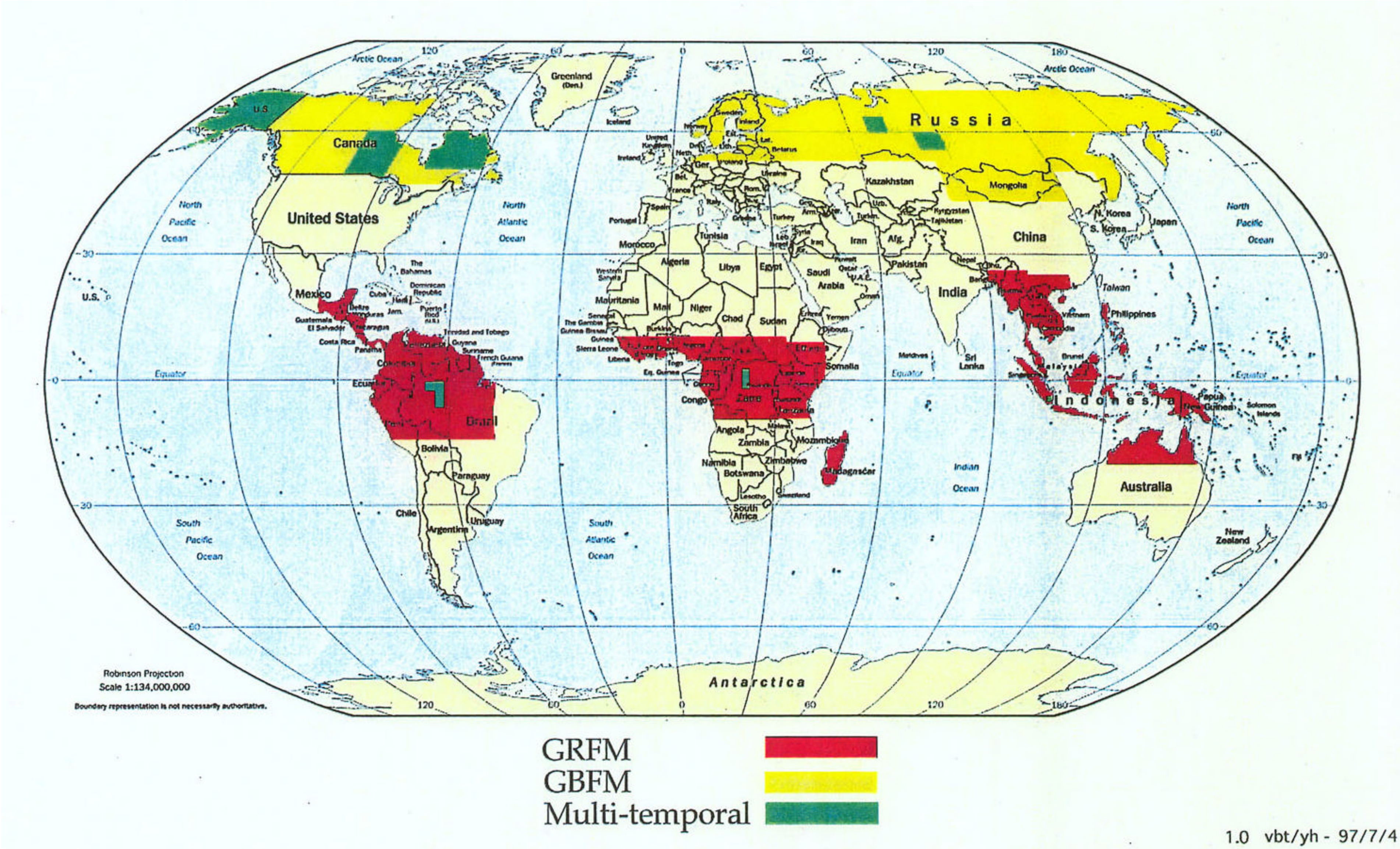
Outline

- Global Rain Forest mapping mission
- Boreal Forest mapping mission
- RGPS and the Arctic Snapshot
- RADARSAT-1 Antarctic Mapping Missions
- Alaska DEM Project


Arctic Ocean
Greenland (Den.)
Russia
Canada
U.S.
United States
Mexico
Kazakhstan
Mongolia
China
India
Japan
Australia
Brazil
Bolivia
Paraguay
Argentina
Chile
Uruguay
Algeria
Libya
Egypt
Sudan
Chad
Niger
Mali
Mauritania
Morocco
Angola
Zambia
Namibia
Botswana
Zimbabwe
Mozambique
Somalia
Saudi Arabia
Iran
Pakistan
Philippines
Indonesia
Papua New Guinea
New Zealand
North Pacific Ocean
North Atlantic Ocean
South Pacific Ocean
South Atlantic Ocean
Indian Ocean
Antarctica
Robinson Projection
Scale 1:134,000,000
Boundary representation is not necessarily authoritative.
GRFM
GBFM
Multi-temporal
1.0 vbt/yh - 97/7/4

Global Rain Forest Mapping

NASDA Earth Observation Research Center in collaboration with:

- NASA Jet Propulsion Laboratory (JPL)
- European Commission Joint Research Centre Space Applications Institute (JRC SAI)
- Alaska SAR Facility (ASF)
- Earth Remote Sensing Data Analysis Center of Japan (ERSDAC)
- Remote Sensing Technology Center of Japan (RESTEC)

with significant scientific input also from the

- University of California Santa Barbara (UCSB)
- Brazilian National Institute for Space Research (INPE)
- National Institute for Research of the Amazon (INPA)

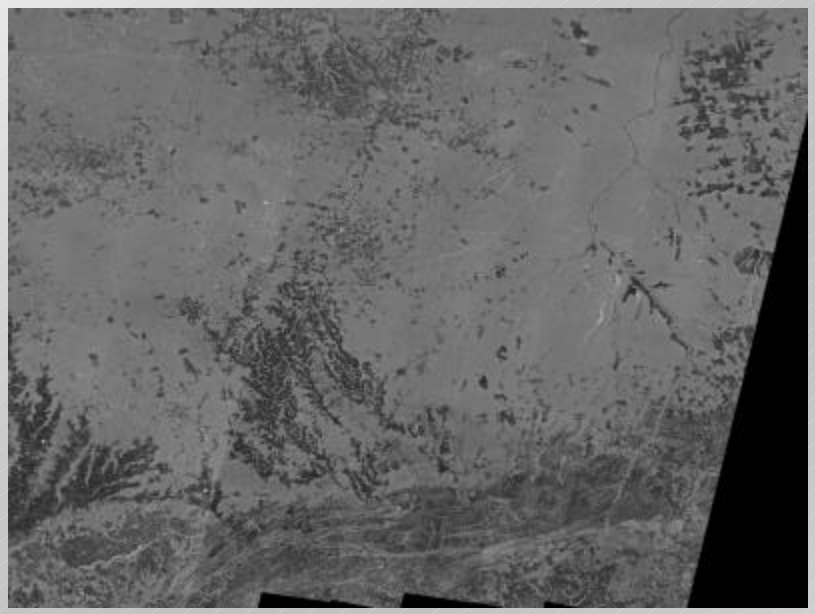
GRFM Goals

The project goals are:

- to acquire spatially and temporally contiguous L-band Synthetic Aperture Radar (SAR) data sets over the tropical belt of the Earth using the Japanese Earth Resources Satellite (JERS-1)

- to generate semi-continental scale, 100 m resolution, image mosaics to be provided for research and educational purposes world wide.

Sample Image from the Amazon



- ASF processed 1500+ images for the project
- Final mosaic broken into 26 blocks
- SAR mosaic data available in low resolution on CDROM.

International Partners in the Global Boreal Mapping Project

- NASDA
  - Earth Observation Research Center (EORC)
  - Earth Observation Center (EOC)
- Japanese Ministry of International Trade & Industry (MITI)
- NASA
  - Jet Propulsion Laboratory (JPL)
  - Alaska SAR Facility (ASF)
  - Earth Science Enterprise Office
  - Terrestrial Ecology Program
- European Commission's Joint Research Centre
- Swedish Space Corporation (SSC)
- Canadian Centre for Remote Sensing (CCRS)
- German Space Agency (DLR)

GBFM processing

- Total JERS-1 Frames processed: 25015
- Sources of data:
  - ASF acquired for GBFM: 18,650
  - ASF previously acquired: ~2,500
  - Acquired in Canada: ~1,000
  - Retrieved from ASF Signal Data Archive: 2,865 (acquired originally for NASDA)
  - HEOC acquired : ~12 revs

Boreal Forest Mapping Products

Imagery:

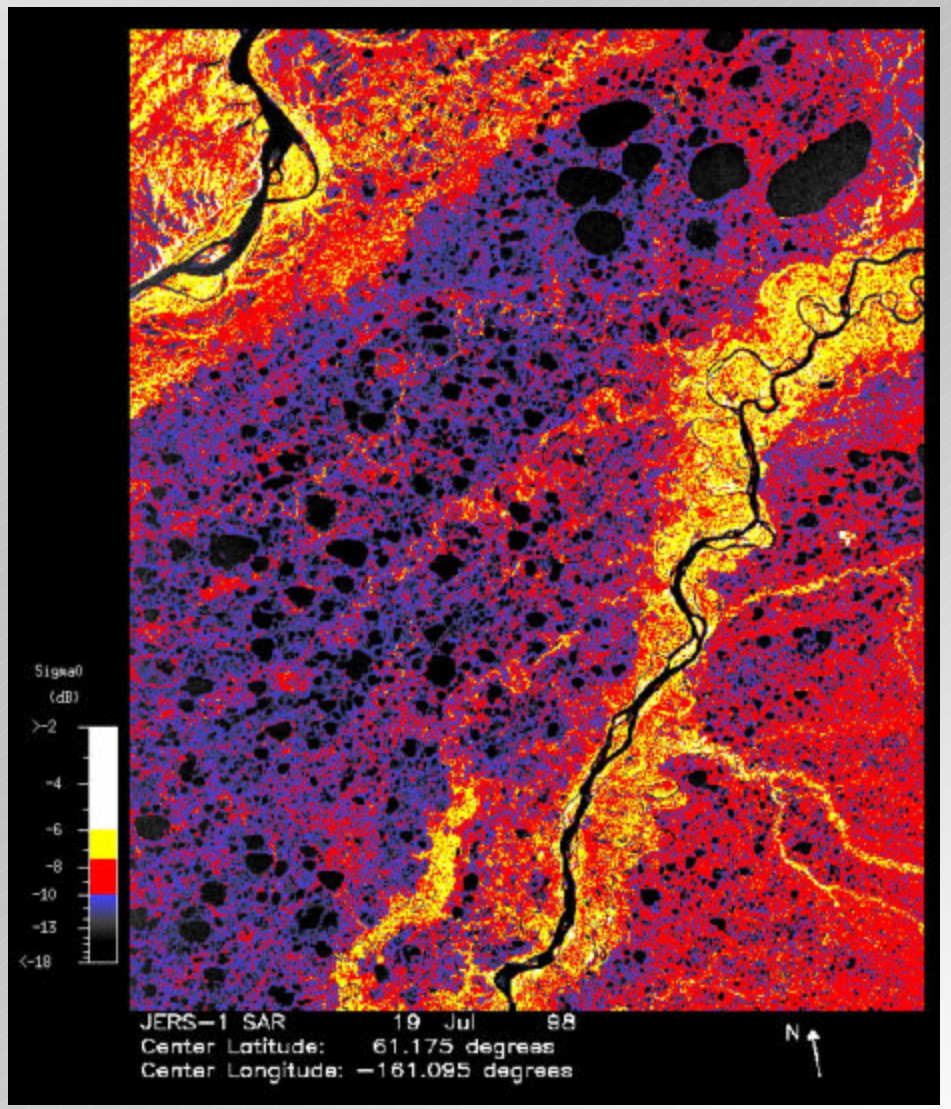
The 100 m resolution imagery for this project will be available to the public through a project web site.

Full resolution imagery is available to researchers through the Alaska SAR Facility.

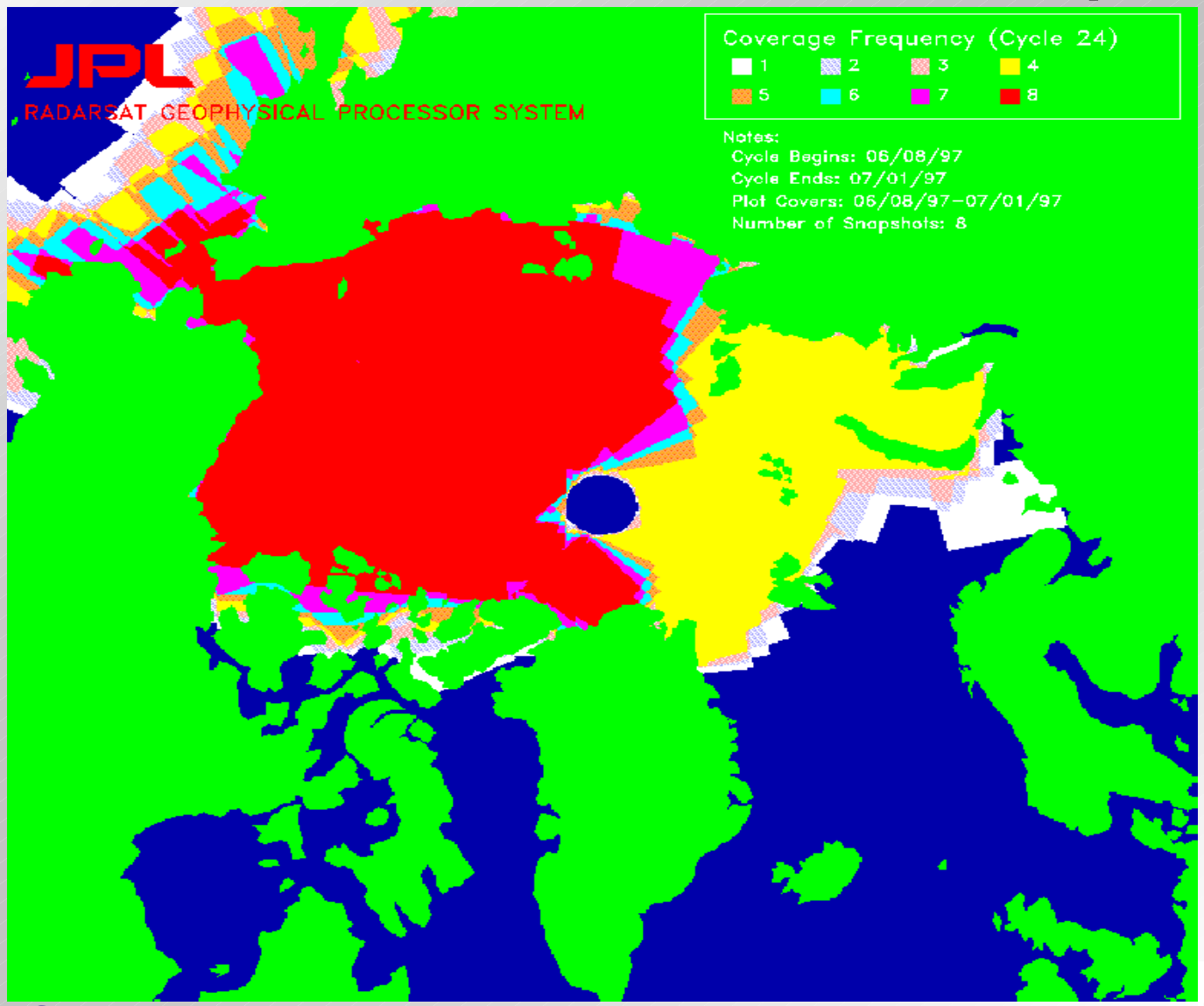
Mosaics:

Continental Scale	1 km resolution, summer and winter
Regional Scale	100 m resolution 1 million sq. km regions, multi-temporal
Local scale	100 m resolution 10,000 sq. km regions, multi-temporal

Boreal Forest Sample

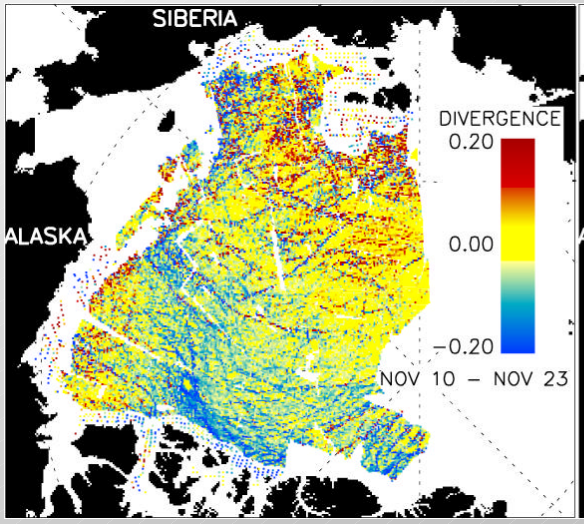


Arctic Snapshot



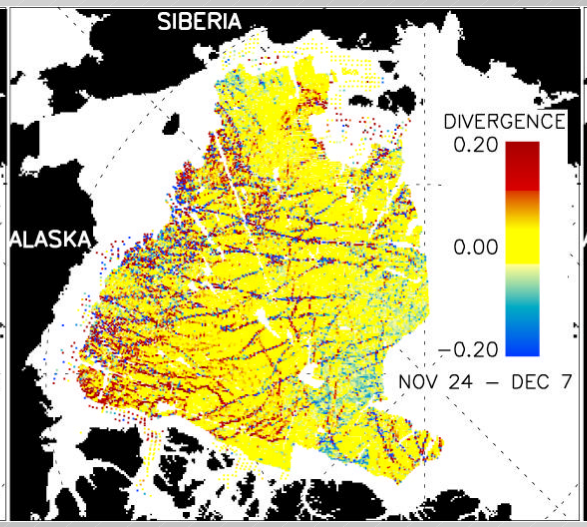
DIVERGENCE OVER THREE PERIODS (41 days)

Nov 10 - Nov 23



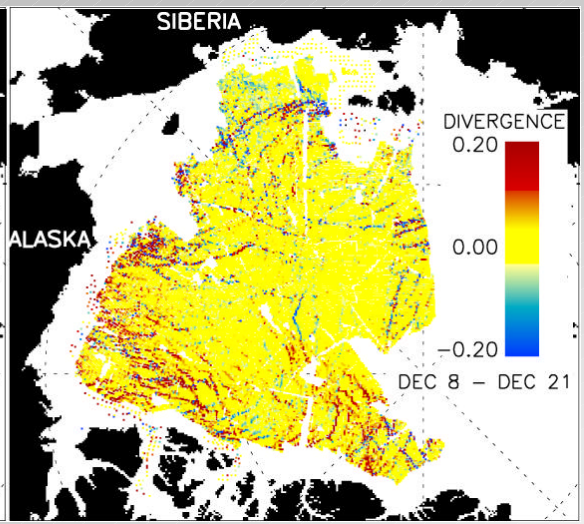
• **Large convergence near Canadian Archipelago causing extensive pressure ridging**

Nov 24 - Dec 7



• **Lead patterns show leads spanning large part of the Arctic and characteristic intersecting angles**

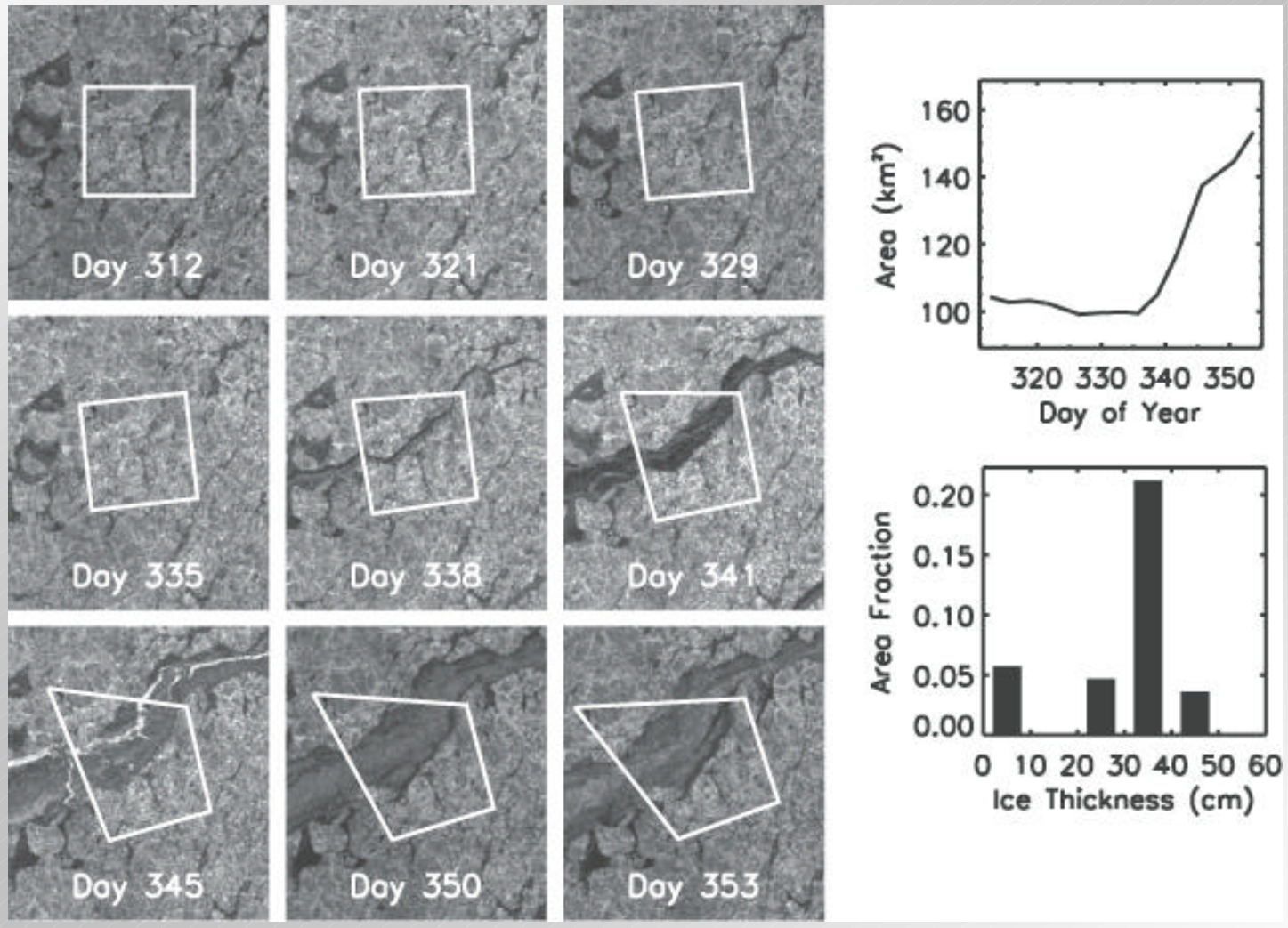
Dec 8 - Dec 21



• **Period of relatively low activity**

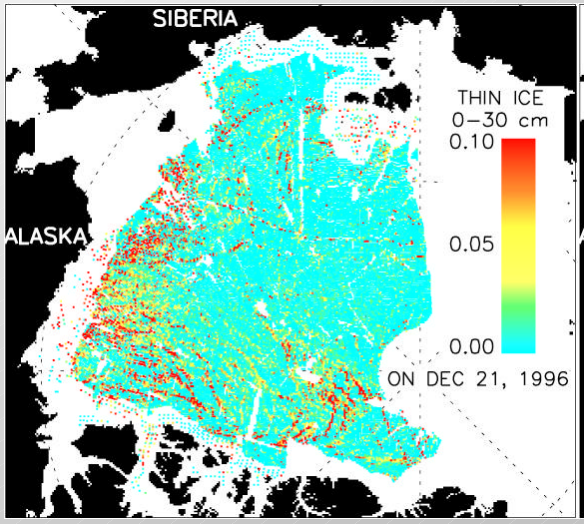
Positive Div = Openings
Negative Div = Closings

ICE THICKNESS FROM KINEMATICS



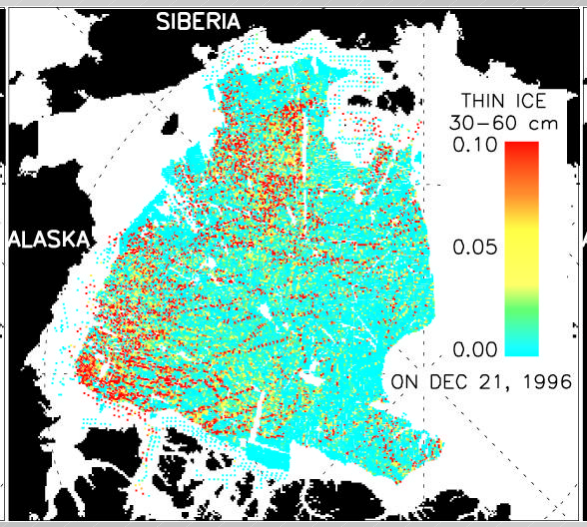
THIN ICE COVERAGE ON DEC 21, 1996

0-30 cm



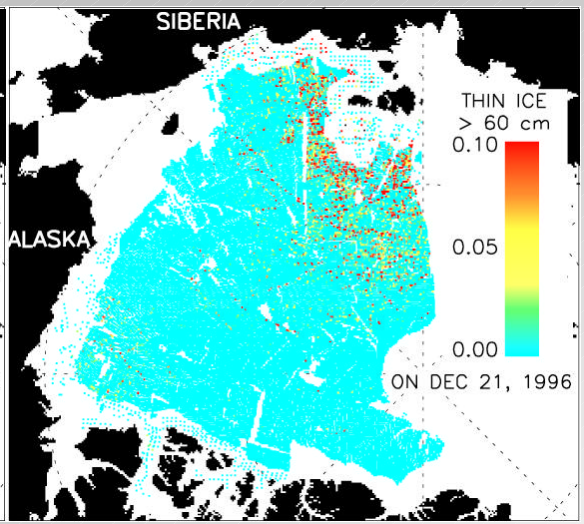
• **Coverage of thinnest ice reflects lead activity during the latest period (Dec 8 - Dec 21)**

30-60 cm



• **Sea ice in open leads grows very quickly to 30-60 cm**

60-90 cm



• **Growth rate slows as the ice thickens to over 50 cm**

RADARSAT-1 Antarctic Mapping Project

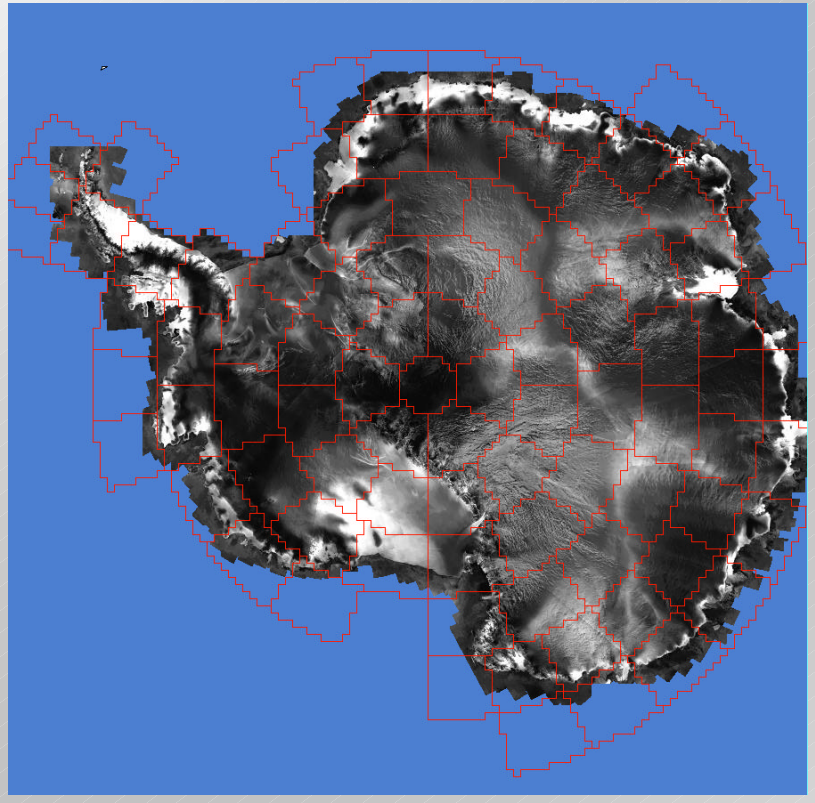
The RADARSAT Antarctic Mapping Project is a collaboration between the **NASA** and the **CSA** to map Antarctica using the RADARSAT-1 satellite.

- The Antarctic Mapping Mission (AMM-1) of 1997 provided the first, complete, high-resolution imagery of Antarctica.
- The Modified Antarctic Mapping Mission (MAMM)of 2000 acquired the first, three-cycle interferometric radar map of the regions north of -80 degrees.

RAMP data applications

- Ice sheet glaciology: ice sheet mass balance and ice sheet dynamics
- Ice Streams: mapping and flow analysis
- Grounding Lines location
- Change detection
- Coastal Processes
- Ice Shelf margins
- Icebergs and ice tongues
- Ice sheet margin
- Sea ice
- Antarctic Geology
- Antarctic Paleoclimate

AMM1 final product



Ken Jezek, RAMP PI, and his team at Byrd Polar Research Center have processed the Level-1 SAR images to a final product.

The final products are available from ASF.

Alaska Mapping Research

- Work with State to develop long-term strategy for acquiring and updating maps of the State
- Produce a set of recommendations to make “Smart Buyers” of State agencies when buying terrain-mapping services
- Develop useful Digital Elevation Models (DEMs) and ancillary data at appropriate scales regions of interest within the State

Goals and Objectives

- Acquire all SRTM data of Alaska
- Assess the suitability of ERS Tandem Mission data to support DTED-2 specs
- Create a moderate resolution DEM of the two highest priority regions of the State from Tandem Mission data
- Analyze the DEMs created at the different scales and with the different systems, comparing scale, accuracy, terrain type, and cost

InSAR Priority Regions